Treaty History & Requirements

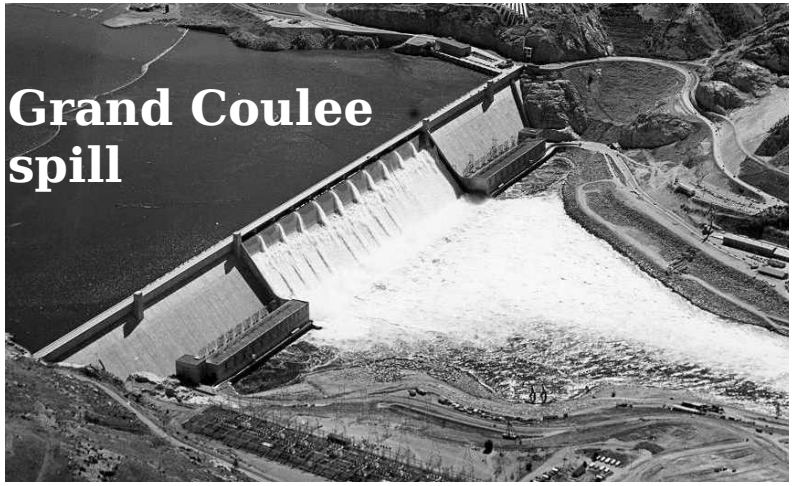
Columbia River Treaty

Too Much or Too Little Water

Vanport destroyed in

Trail B.C. flood in

Draught



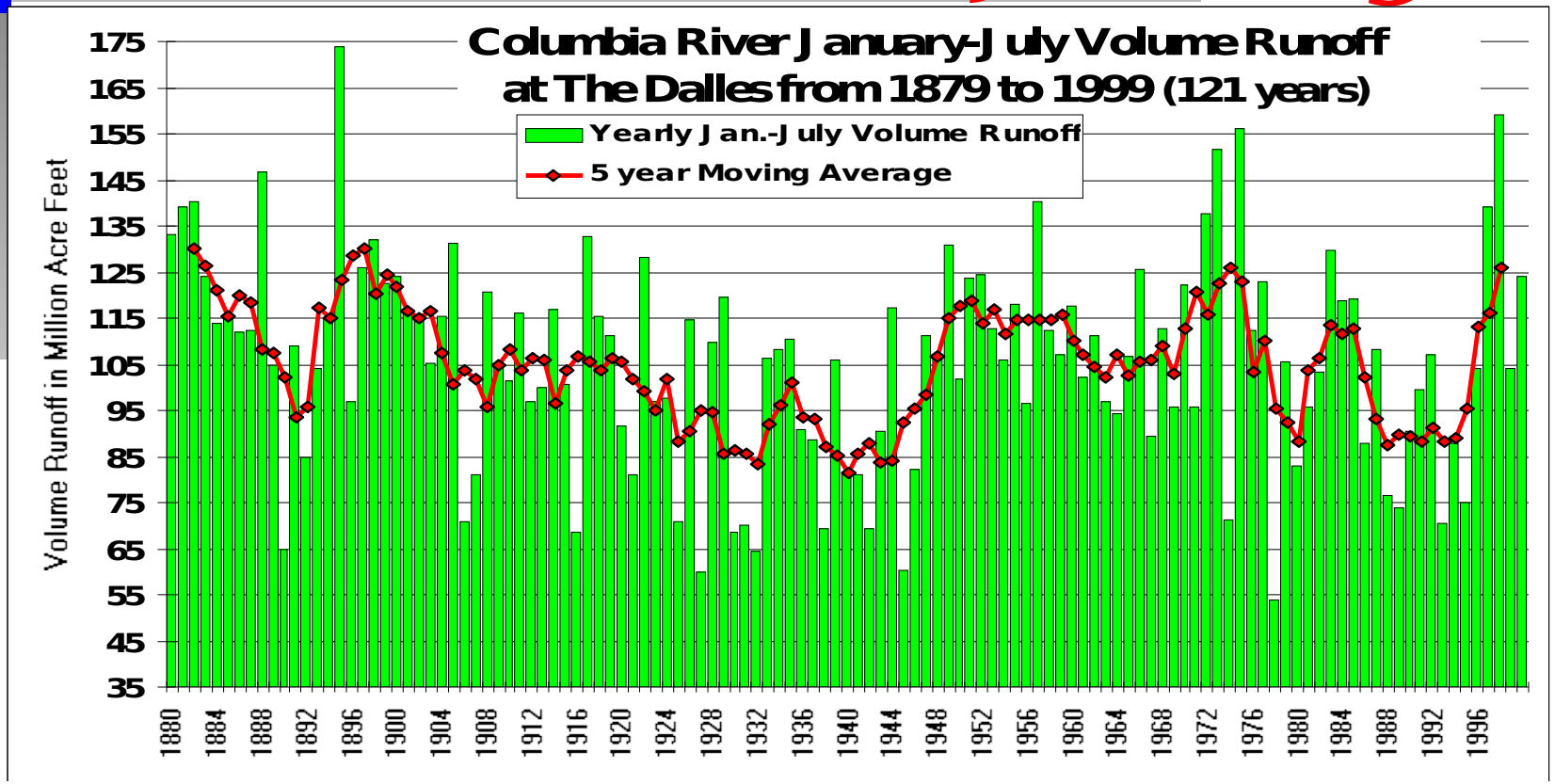
Grand Coulee spill

Why did we need a Treaty?

About 1/3 of the Columbia River water comes from Canada.

- Canada has 15% of the basin area, but 30% of 134 million acre feet (Maf) average annual flow at The Dalles.
- 50% of worst Columbia flood flows (1894) at The Dalles came from Canada.
- Flow at border varies from 14,000 to 555,000 cubic feet per second (cfs), much wider variation (1:40) than

Year to Year Variation in Flow
About +/- 50% of Average

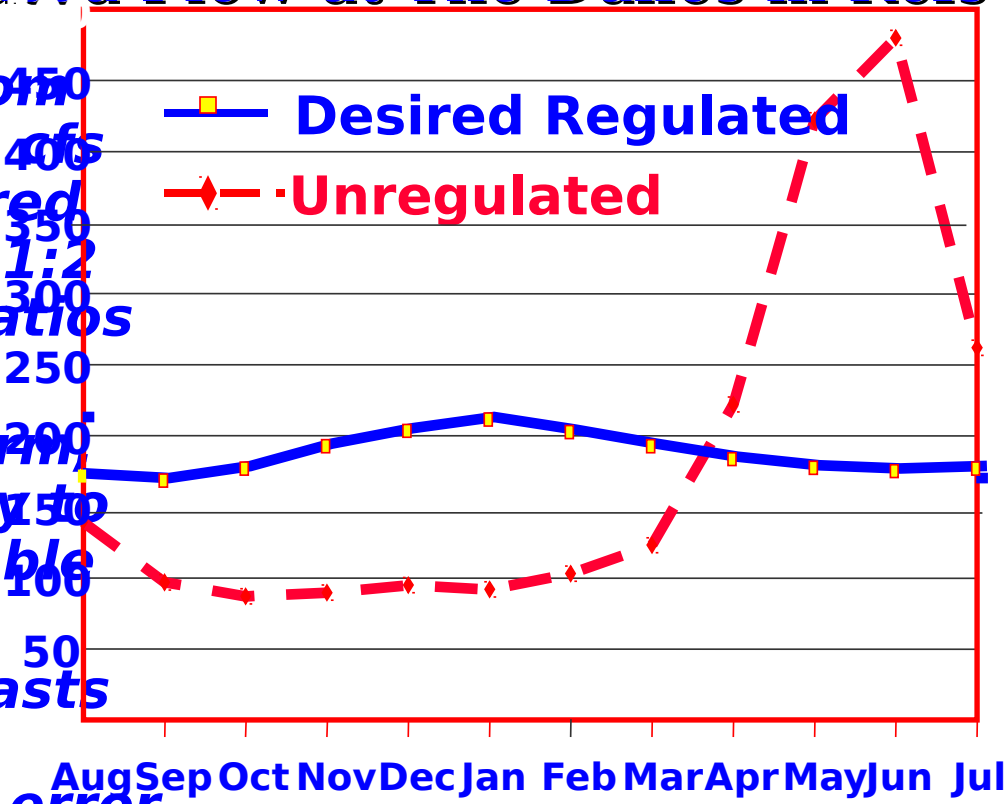


Minimum = 53.5 maf, Average = 105.6 maf, Maximum = 173.8 maf

Long-term trends are apparent over time, but year to year variations are almost random, with no reliable next year forecast.

Large Seasonal Variation in Flow

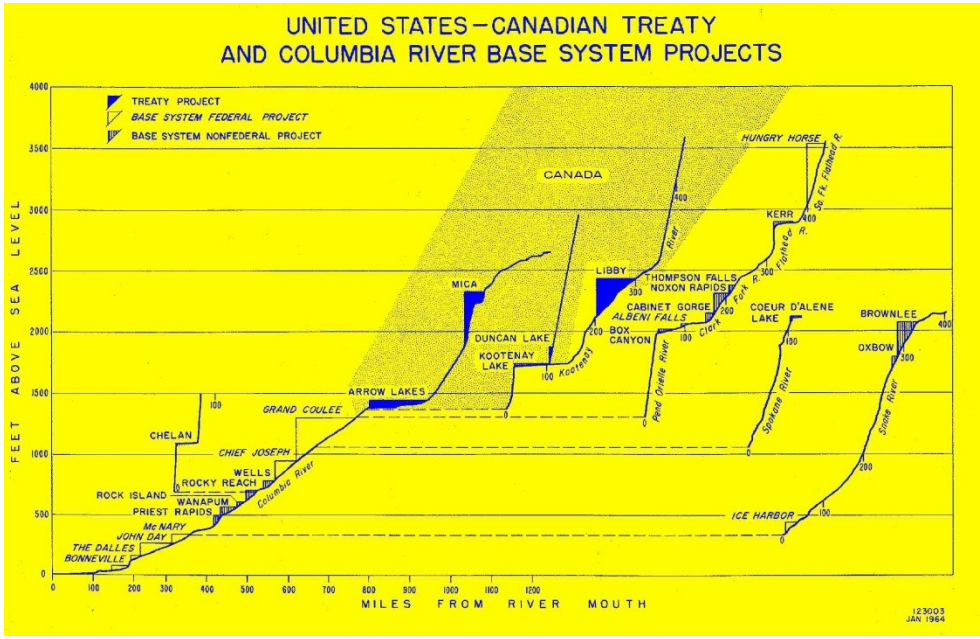
Comparison of 50-year Average Monthly Unregulated Flow to Desired Regulated Flow at The Dalles in Kcfs

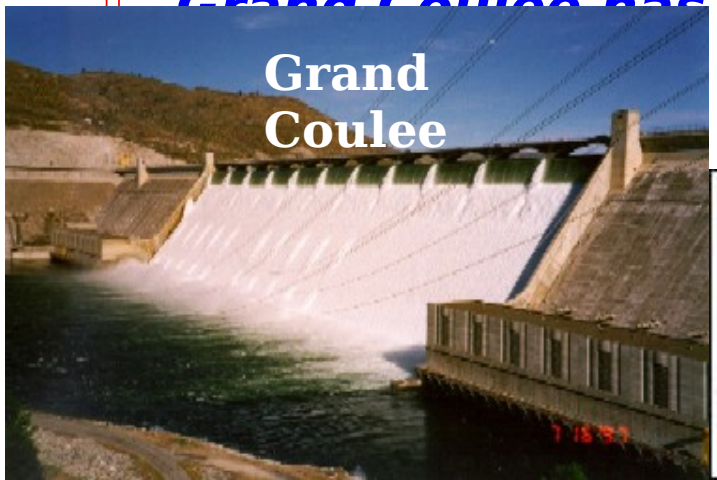


- ***Unregulated flow at The Dalles varies from 36,000 to 1,240,000 cfs a 1:34 ratio, compared to the St. Lawrence 1:2 & Mississippi 1:25 ratios***
- ***Reservoir storage converts spill, nonfirm, and unusable energy to firm energy and usable nonfirm energy.***
- ***Seasonal flow forecasts are poor. The 95% probability forecast error for the January forecast of the Jan-July volume runoff at The Dalles is +/- 27 maf.***

Columbia is the most powerful river in North America

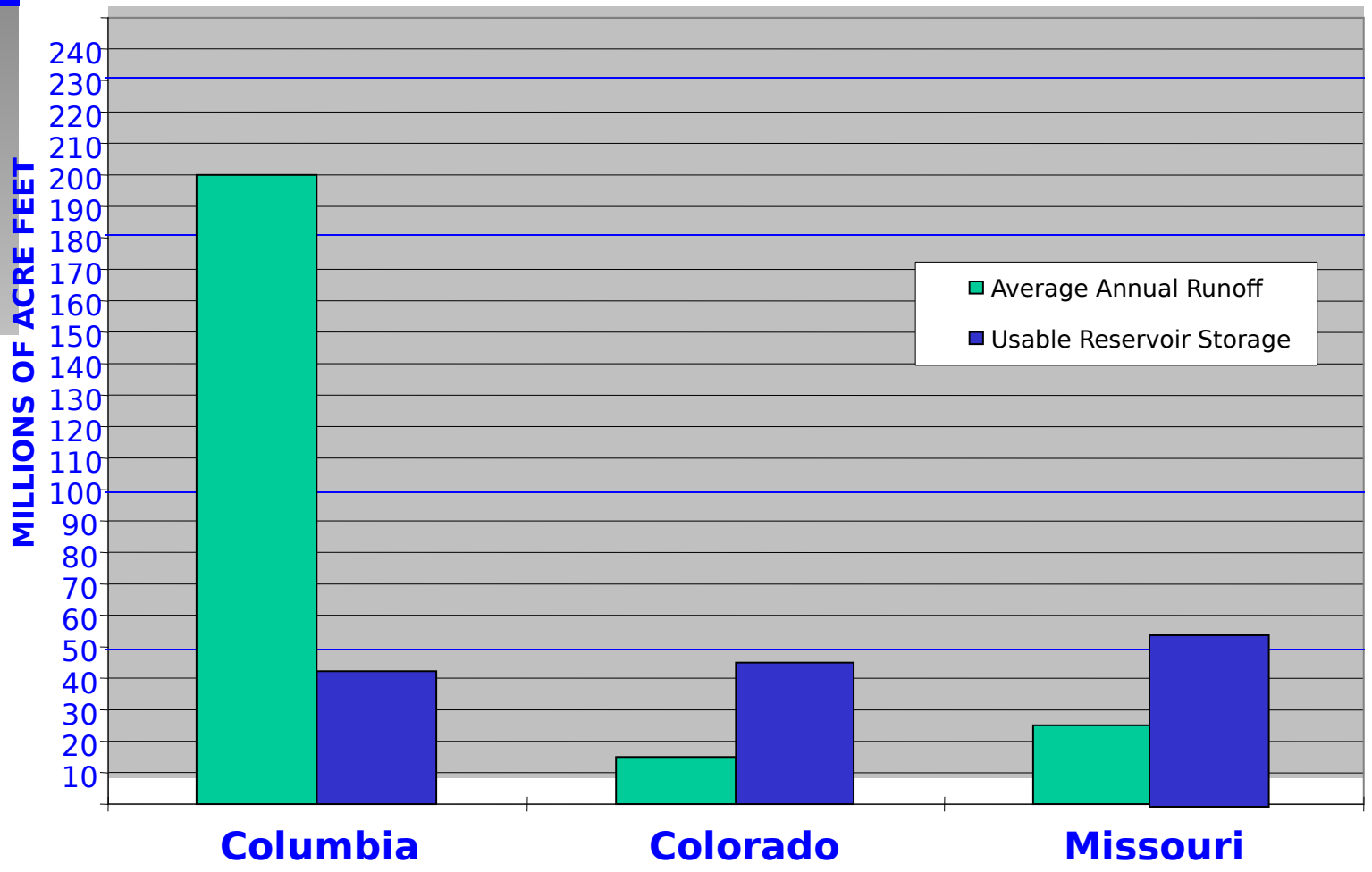
- *Hydropower is measured by river flow times change in elevation (called "head")*
- *St. Lawrence and Mississippi have more flow, but much less head*
- *Grand Coulee has*



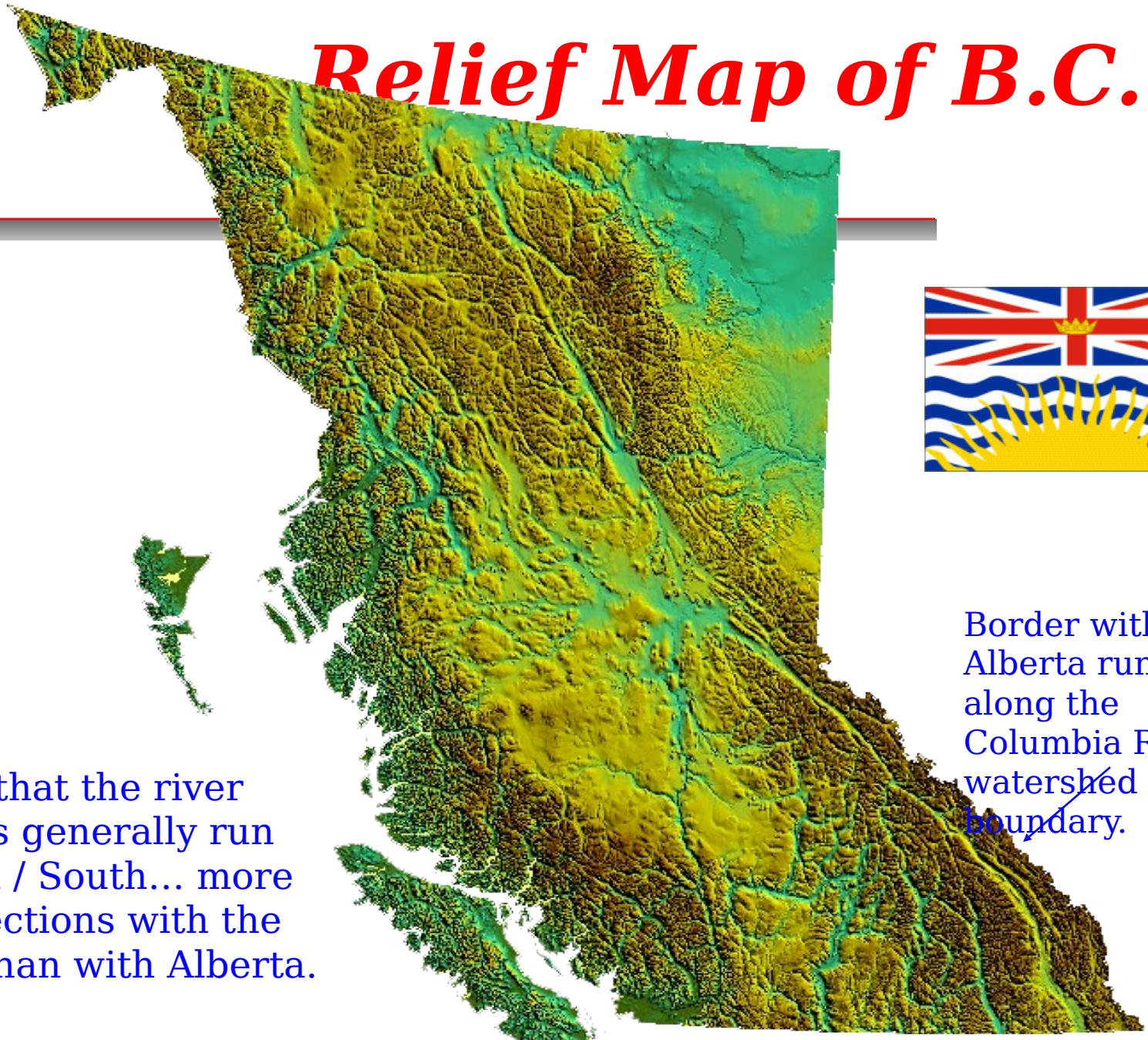


Niagara Falls & Powerhouse

Average Annual Runoff And Usable Reservoir Storage Major Western River Basins



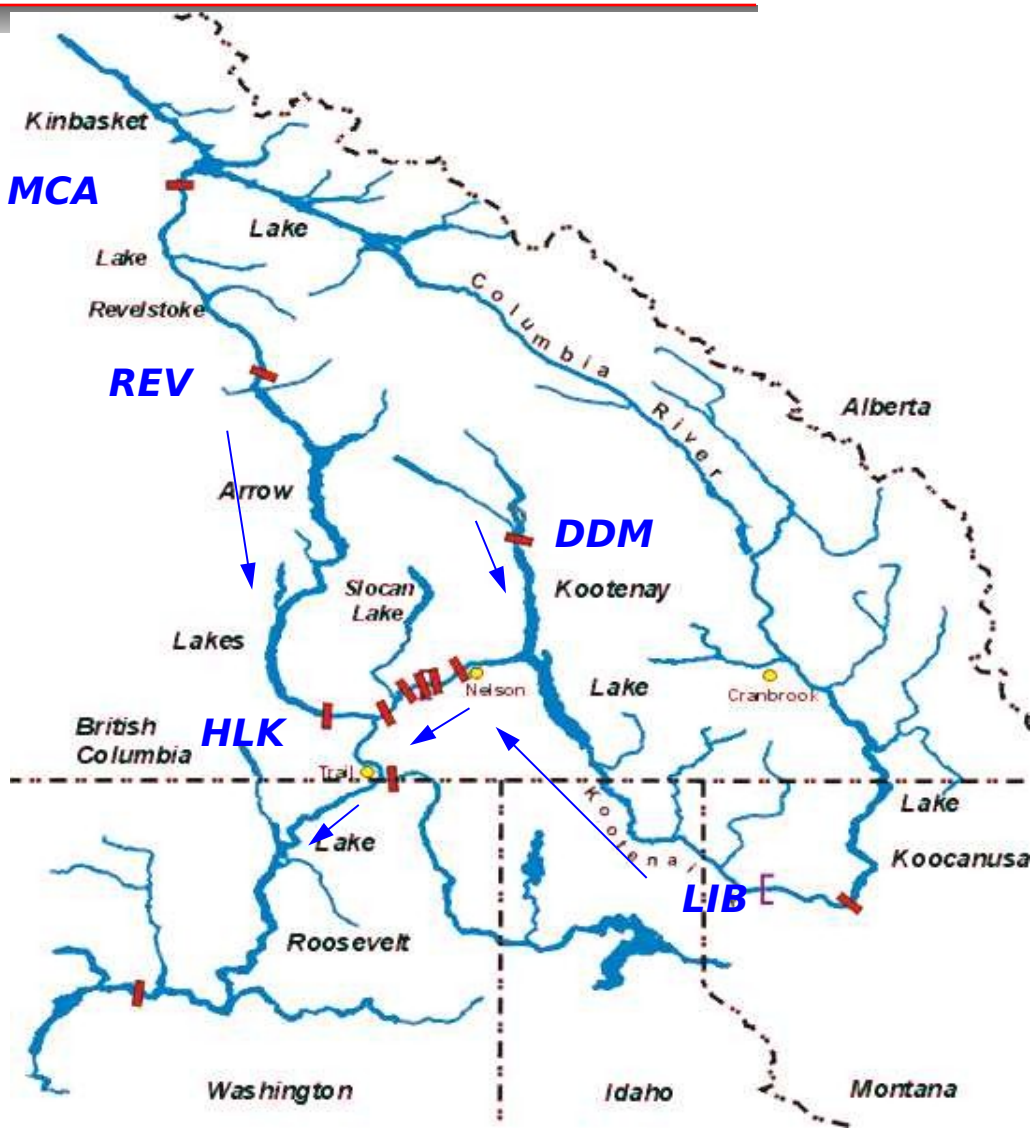
Relief Map of B.C.



Border with Alberta runs along the Columbia River watershed boundary.

Note that the river basins generally run North / South… more connections with the U.S. than with Alberta.

Columbia / Kootenay System



How did we get the Treaty?

- 1954-60 negotiations led to signing of Columbia River Treaty by Prime Minister Diefenbaker and President Eisenhower on 1/17/61
- Treaty soon ratified by U.S. Senate, but not by Canada. B.C. needed money to build dams on both Columbia and Peace rivers, so needed to sell the downstream power benefits; the Canadian government initially opposed such a sale.
- 1961-64 negotiations between U.S. & Canadian governments led to a Treaty Protocol, signed January 22, 1964, that allowed the sale of the Canadian Entitlement to the U.S., and clarified several issues, one of which increased the Canadian Entitlement to U.S. downstream power benefits from earlier estimates.
- 1961-64 negotiations between Canada, British Columbia, the U.S. government, and U.S. mid-Columbia utilities led to an agreement on $254.4 million price for 30-year sale of the Canadian Entitlement.

Signing the Treaty in 1961

Proclamation and Exchange of Diplomatic Notes at Peace Arch - 16 Sept. 1964

Columbia River Treaty Organization

CANADIAN GOVERNMENT
Ministry of Foreign Affairs & Trade
Ministry Natural Resources

BRITISH COLUMBIA GOVERNMENT

TREATY

UNITED STATES GOVERNMENT
Department of State
Department of Army
Department of Energy

PERMANENT ENGINEERING BOARD
*
CANADIAN UNITED STATES

CANADIAN ENTITY for Art.XIV2j*

CANADIAN ENTITY
*

United States ENTITY
*

PEB ENGINEERING COMMITTEE
***
CANADIAN UNITED STATES

CANADIAN COORDINATOR & SECRETARY
**

OPERATING COMMITTEE
**
CANADIAN UNITED STATES

United States COORDINATOR & SECRETARY
**

HYDROMETEOROLOGICAL COMMITTEE
**
CANADIAN UNITED STATES

* **Established by TREATY**

** **Established by ENTITIES**

*** **Established by PEB**

Doug Robinson, Canadian Entity Secretary

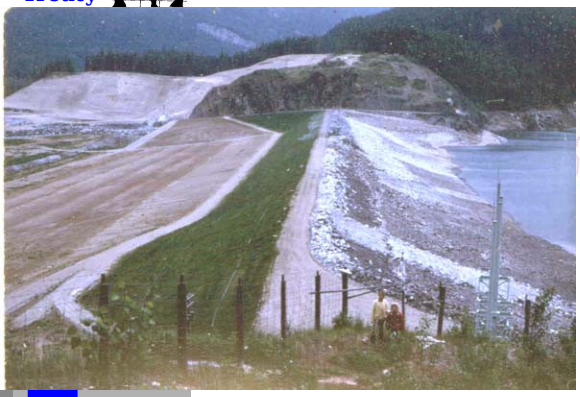
Canadian Treaty Storage

- By 1960, 13.0 million acre-feet (MAF) of storage was in place in the US. A further 15.5 MAF was needed to limit the flow at The Dalles to a tolerable limit of 600 kcfs. This established the volume requested by the US.
- A multitude of potential project configurations were proposed: all included Duncan as built; high Arrow and low Arrow (Murphy) options were considered; and various Mica and East Kootenay options were considered.
- The eventual design included 7.0 MAF at Mica, 1.4 MAF at Duncan and 7.1 MAF at Arrow (the high Arrow option).
- The latter would raise the level of the Arrow Lakes by 40 feet above the natural high water line for a total rise and fall of 66 feet. It would flood 20,000 acres of arable land, inundate 50 miles of beaches and displace 2,000 residents.

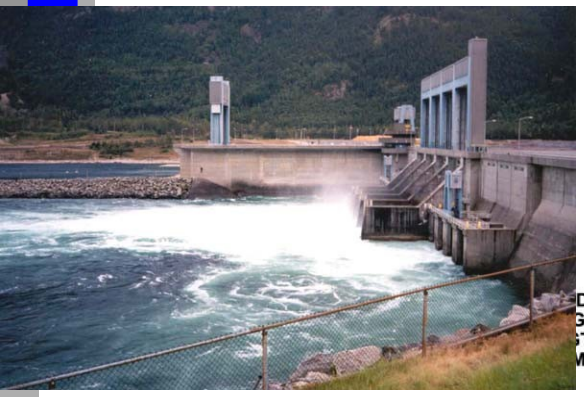
What does the Treaty Do?

- The Treaty required Canada to construct and operate 15.5 Maf of storage on the Columbia River and Duncan River in Canada for optimum power generation and flood control downstream in Canada and the U.S.
- U.S. must return to Canada one-half of the downstream power and flood control benefits this storage produces in the U.S.
- The Treaty allowed the U.S. to construct and operate the Libby project with 5 Maf storage on the Kootenai River in Montana for flood control and other purposes.

Columbia River Treaty

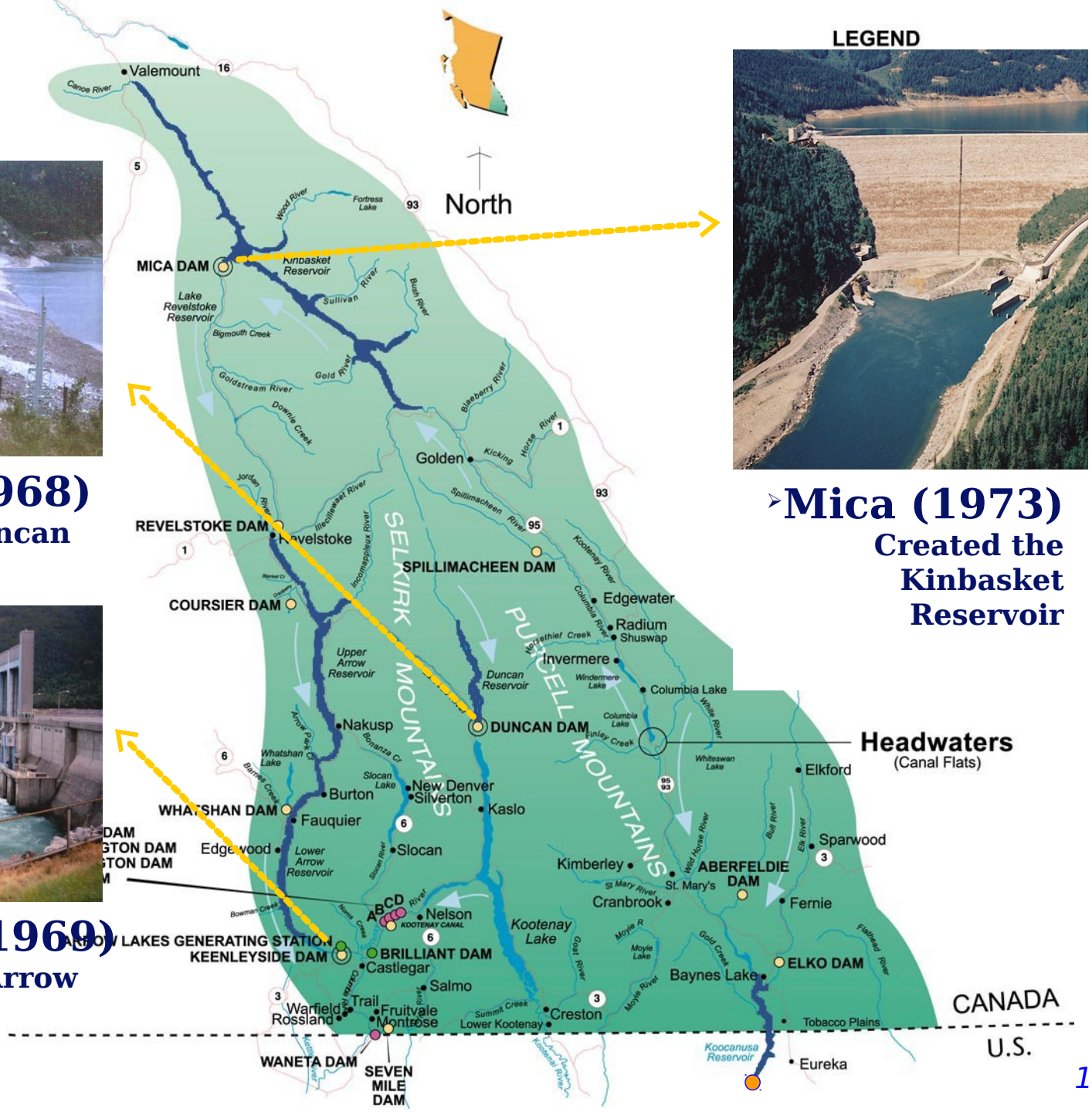


Duncan (1968)
Created the Duncan Reservoir



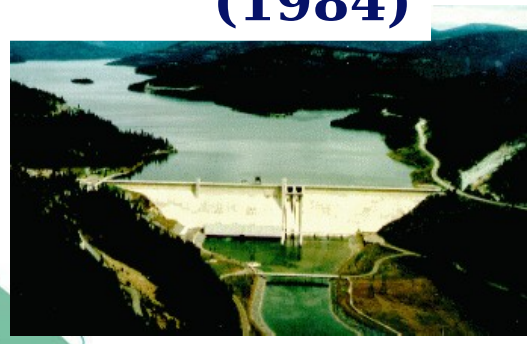
Keenleyside (1969)
Created the Lower Arrow Reservoir

Mica (1973)
Created the Kinbasket Reservoir

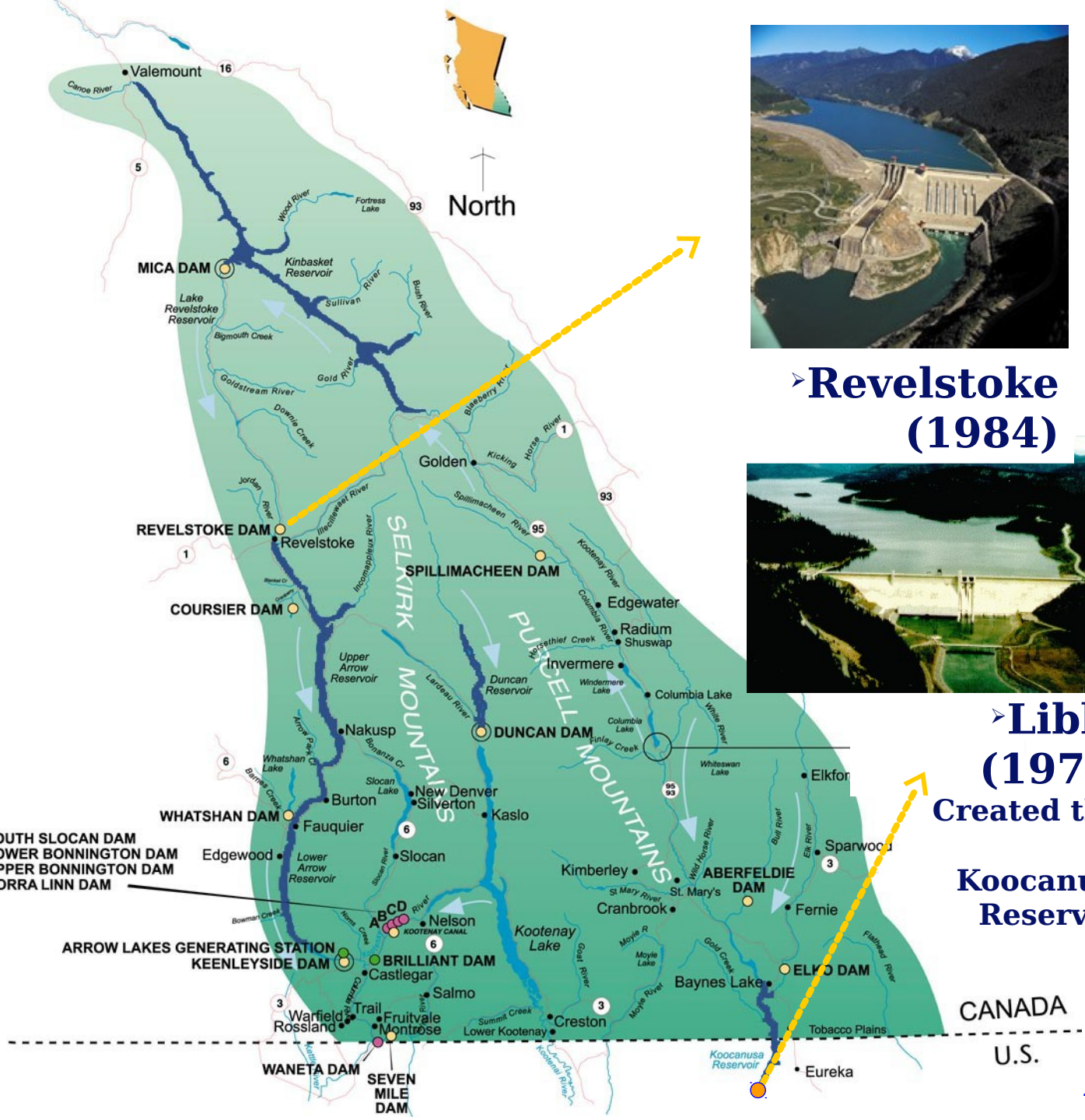


Columbia River Treaty

➢**Revelstoke (1984)**



➢**Libby (1973) Created the Koocanusa Reservoir**



Treaty priority for water use

1. Domestic & consumptive uses - drinking water, irrigation, etc.

2. Flood control - hard upper limit on reservoir levels … “trumps” all operations for energy production

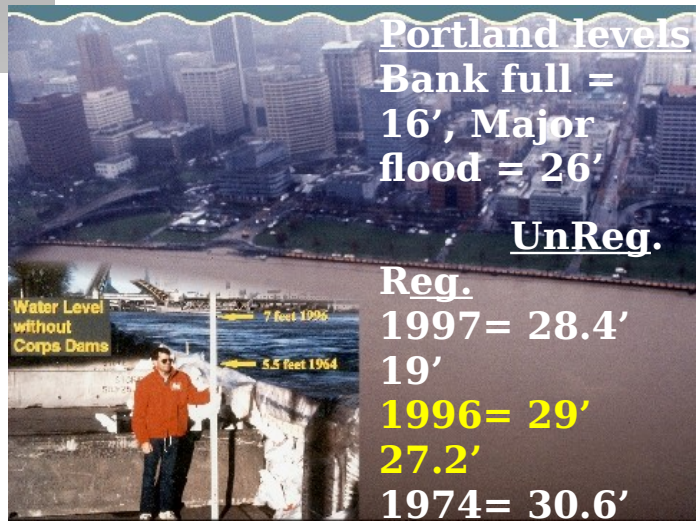
3. Firm energy - must draft reservoirs as far as is necessary to meet the specified firm energy requirement

4. Reservoir refill - refill by 31 July to maximize firm energy capability for the following year

5. Secondary energy - “less useful” energy, since it is not guaranteed in all years

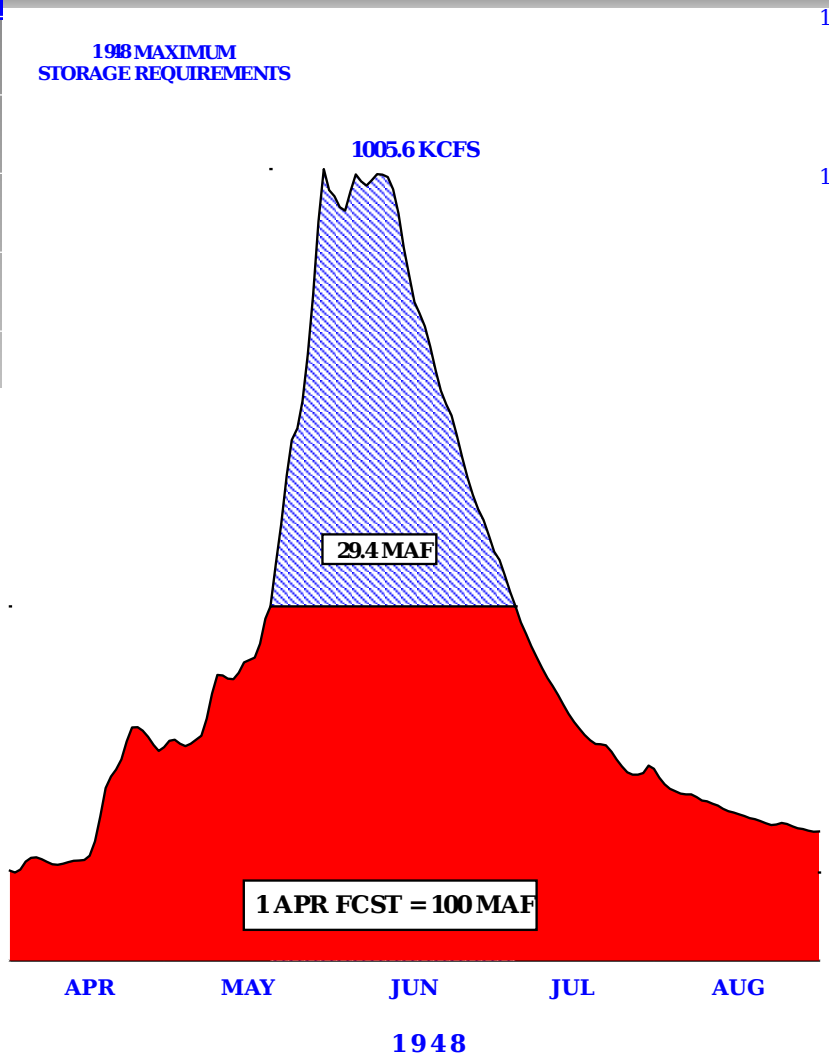
Treaty Provisions for Flood Control

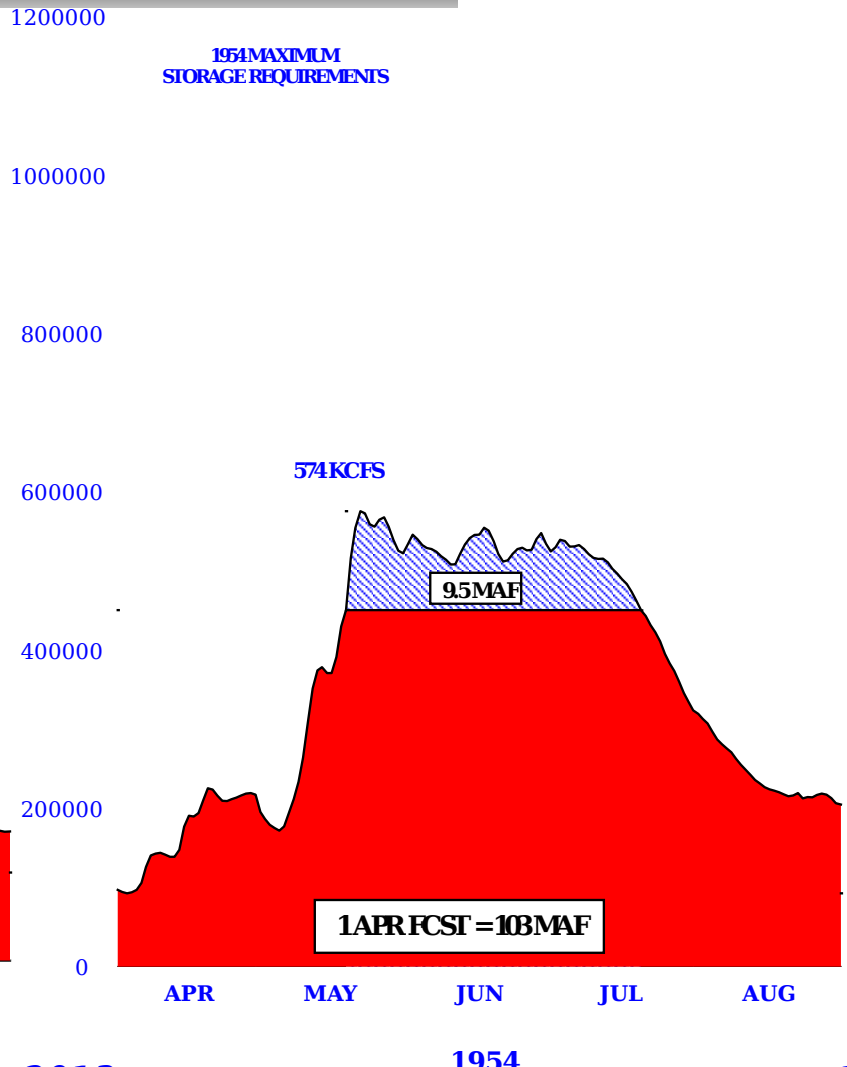
- 8.45 million acre feet (Maf) of storage at Arrow, Duncan, and Mica is assured for flood control operation.
- Additional 7 Maf of Treaty Storage and 5 Maf of Non-treaty storage available “on call” for large floods at cost of $1.875 million at each of the first four requests.
- $64,400,000 cash payment made to Canada by U.S. Government at the completion of the three Canadian projects for one-half of the estimated present worth of future flood damages prevented in the U.S.



- Corps or Engineers estimates that Treaty Storage prevented over $200 million ($1985) in 1972 and 1974.
- Treaty storage reduced 1997 peak flows at The Dalles by 170,000 cfs , and prevented about $197 million in flood damages.

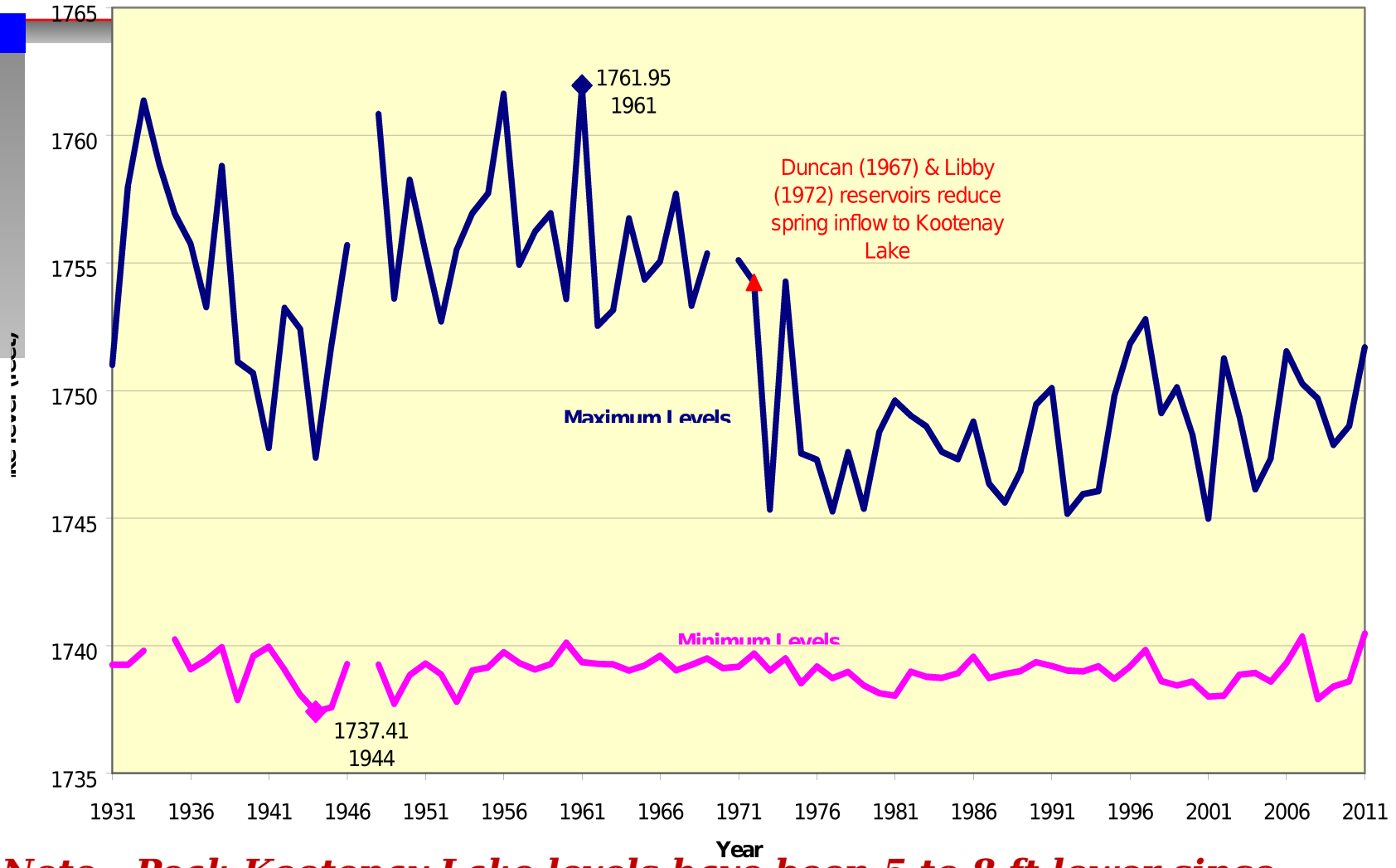
Runoff - Which Shape This Year?





Treaty Flood Control benefits in Canada

Columbia River Treaty



Note - Peak Kootenay Lake levels have been 5 to 8 ft lower since construction of the upstream Treaty dams (Libby and Duncan)

Treaty Provisions for Hydropower

- 15 1/2 million acre feet of Canadian storage is operated for optimum power generation downstream in Canada and the US.
- Canada has Entitlement right to receive 1/2 of increased power generated downstream in the U.S. due to operation of Canadian Treaty storage.
- Power benefits from treaty storage are defined as dependable capacity and average annual usable energy.
- Downstream power benefits (DPB) resulting from Libby storage operation belong to the country where they are generated, ie U.S. or Canada.
- The hydroelectric operating plans provide a monthly reservoir balance relationship for the whole of Canadian storage, allowing Canada flexibility to operate individual projects for maximum Canadian benefit.

Types of Treaty studies

- Assured Operating Plan (AOP)
  - done 6 years in advance (“planning” time horizon) … allows time for construction of new resources
  - downstream benefits calculated from AOP
- Detailed Operating Plan (DOP)
  - done just prior to the operating year … revises &/or confirms the operating rules that were agreed on in the AOP … only by mutual agreement
- Treaty Storage Regulation (TSR)
  - implements the DOP rules within the current operating year based on the actual & forecast runoff for each Columbia River project

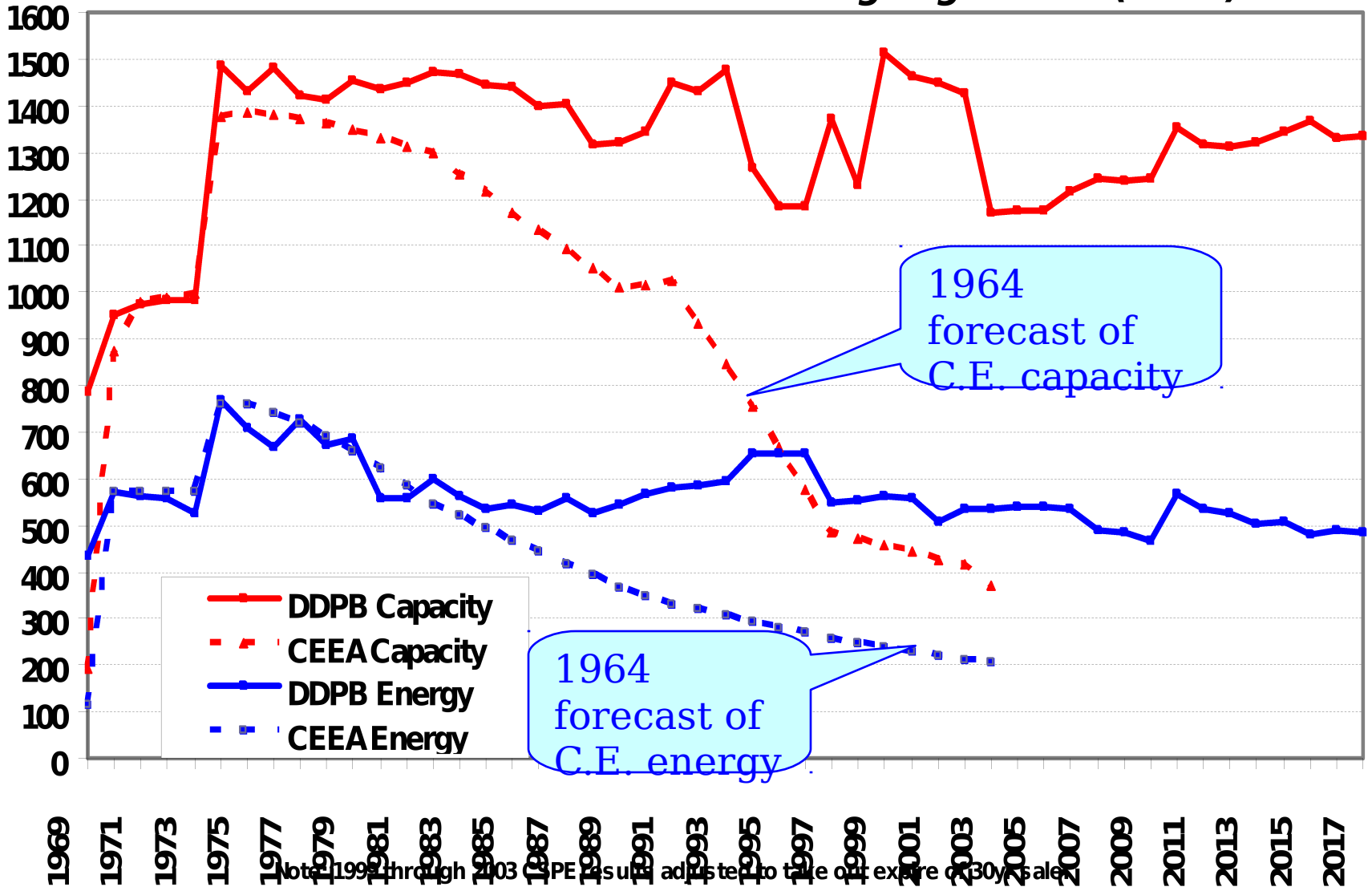
Determination of Downstream Power Benefits

- Determination of Downstream Power Benefits (DDPB) is based on the Assured Operating Plan, not the real storage operation.
- The Canadian Entitlement, which is one-half of the power benefits produced in the U.S., is calculated annually from the difference in Dependable Capacity and Average Annual Usable Energy for the 1961 U.S. Base Hydroelectric System, with and without the addition of Canadian Treaty storage.
- Using the 1961 U.S. Base System puts Canadian Treaty storage on a “first-added” basis ahead of coordination benefits from Libby and Dworshak dams and the PNW-California transmission intertie.
- Canadian Entitlement deliveries are not affected or adjusted to reflect actual or real

Return of the Canadian Entitlement

- The Treaty provided for Entitlement delivery to Canada at the U.S.-Canada boundary at a point near Oliver, B.C. unless otherwise agreed.
- Nov. 1996 Entity Agreement provides for delivery of the Entitlement to the Canadian border at existing points of inter-connection at Blaine and Selkirk and defines scheduling guide-lines.
- March 1999 agreements and exchange of Diplomatic Notes allows delivery and sale of Entitlement power directly within the U.S. to decrease Canadian transmission losses and BPA transmission costs.
- After losses U.S. Entity is currently delivering 486 average MW of energy at maximum hourly rates of 1296 MW capacity at the Canada-U.S. border.
- Transmission capacity for firm deliveries has

Canadian Entitlement from the annual Determination of Downstream Power Benefits (DDPB) and the 1964 Canadian Entitlement Exchange Agreement (CEEA)



Note: 1999 through 2003 DDPB results adjusted to take out effect of 30 yr sale

Canadian Control / Flexibility

- The Treaty does not turn over control of Canadian reservoirs and rivers to U.S… it agrees to specific operations under specific conditions.
- Protocol 1 clarified that on-going Canadian flood control obligations after 2024 are subject to specific limits, and are only to be used after U.S. flood control is fully utilized.
- Protocol 7 clarified that the Treaty requirement was for a flow at the border, not a specific operation at each Treaty project (subject to maintaining Flood Control abilities at each project).
- Flood Control plans are developed to minimize flooding in both countries; Power plans are developed to optimize generation in both countries.
- The Mica project was built 5 MAF larger than required under the Treaty. This increased the ability to “flex” water within Canada to address domestic power, social and environmental needs.

Treaty Benefits to Canada

- Payment of US$64.4 million (1968 - 1973$) for ½ of U.S. Flood Control Benefits (avoided damages) for 60 years.
- 50% of U.S. downstream power benefits (as agreed to 5 years in advance) = CAN Entitlement.
- 30-year sale of CAN Entitlement for $254.4 million (1964$) funded the majority of the Treaty dam / reservoir costs.
- Additional payments for early completion of projects (~$7M).
- Flood control protection in Canada / B.C.
- Stream flow regulation and developed head at Mica provided low cost sources of electric power.
- Libby regulation increased electricity generation on the Kootenay River.
- MacLean's Magazine (Canadian version of “Time”) named the Columbia River Treaty 1 of the 25 greatest events to shape Canada in its first 100 years (i.e. to 1967).

Treaty Costs to Canada

- 2300 people along the Arrow Lakes, Koocanusa, Duncan and Kinbasket reservoirs were displaced (with market-based compensation).
- 600 square kilometres of high value valley bottom land was flooded beneath 412 km of new reservoirs.
- Numerous First Nations archeological and burial sites were submerged and/or degraded by erosion.
- Federal – Provincial relations were seriously strained by Treaty negotiations (now fully corrected).
- On-going impacts from changing water levels, include:
  - Reduced recreation opportunities.
  - Loss of key wildlife habitat.
  - Loss of fish habitat; Trapping of nutrients behind dams.
  - Increased dust storms around reservoirs.
  - Increased transportation problems.
  - Reduced farming and forestry activities.
- Political Tensions: Residents in the region felt they carried the bulk of the Treaty costs, but did not fairly share in the Treaty benefits.

Treaty Term

The Treaty has no end date. Either government has the **option** to cancel the Treaty after 60 years (2024) with
10 years' advance notice. With termination:

- Mica, Duncan, Arrow may continue to operate subject to the 1909 Boundary Waters Treaty
- Libby may continue to operate for the useful life of the project
- Canada must provide some flood control operation for the U.S. as long as the need exists and projects exist, but U.S. must pay Canada's operating costs and power losses
- Canada may continue any Kootenay Diversions

Reasons for Treaty Success

- Natural Synergies / Geography: The U.S. system included large generating projects, but relatively poor or expensive storage projects. The Canadian part of the basin presented a number of very attractive storage sites in the narrow and deep valleys. Win – win arrangements were therefore available.
- Technical Input: Engineers were brought into the issue very early on. Technical principles agreed to by IJC engineers helped to drive the political process (not the other way around).
- Mandated Agencies: Organizations were in place on both sides of the border that cut through political divisions: BC Province on the Canadian side; Corps (for basin-wide FC) and BPA (for basin-wide power) on the U.S. side; the IJC on both sides.
- Historical Relationship: The U.S. and Canada have a long history of addressing issues in a peaceful and constructive manner.

Future of the Treaty

- Either the U.S. or Canada has the option of terminating many aspects of the Treaty as early as Sep 2024, with a minimum of 10 years notice. Called Upon FC continues for life of projects.
- Many societal values have changed since the Treaty was finalized in 1964:
  - Fisheries interests and legal support is greatly increased.
  - Certain fish stocks have dropped dramatically since 1960's.
  - First Nations / Aboriginal issues are much more visible.
  - Many more people live on or near the Columbia River.
  - Environmental issues are much more prominent.
- Power and Flood Control remain very important to modern society, however, and the Treaty has successful delivered these while also addressing other issues.
- Personal belief that the coordinated win-win approach will continue over the long term.

Canada – B.C. Agreement (1963)

- Signed prior to the ratification of the Columbia River Treaty
- Effectively transfers the benefits and obligations of the Treaty to BC.
- Nation to nation representation remains with Canadian Government

Under this agreement Canada is required to :

- Obtain the concurrence of British Columbia before terminating the Treaty.
- If requested by British Columbia, endeavour to obtain the agreement of the United States with respect to any proposal relating to the CRT which Canada and British Columbia agree is in the public interest.

CRT2014 Review Roles

- The government of B.C. is leading the initiative
- Government of Canada is working closely with the Province
- BC Hydro is conducting joint technical studies with the U.S. Entity
- CBT will be an important partner in the consultation process.

BC Hydro

Governance:

- BC Crown Corporation that reports to the B.C. Minister of Energy, Mines and Petroleum Resources
- BC Hydro's Board of Directors is appointed by the B.C. Government
- BC Hydro is an agent of the Crown (i.e. B.C. government)

Canadian Entity:

- BC Hydro was appointed by the Canadian Parliament as the Canadian Entity responsible for construction and operation of the three Canadian Treaty Dams.

Columbia Basin Trust (CBT)

Governance:

- Crown Corporation that reports to the B.C. Ministry of Community and Rural Development.

History:

- Created in 1995 to help address regional impacts of Treaty
- In recognition of the downstream benefits, CBT received an endowment from the Province of B.C. on behalf of Basin residents.
- Total provincial funding has been $353 million.

Purpose:

- Invest capital and manage the assets of CBT, and spend the income earned from investments to deliver benefits to the residents of the Canadian Columbia Basin.

First Nations

- First Nations who assert aboriginal title and rights within the Canadian portion of the Columbia Basin include:
  - Ktunaxa Nation Council
  - Okanagan Nation Alliance
  - Secwepemc Nation comprised of Northern Shuswap Tribal Council (NSTC), Shuswap Nation Tribal Council (SNTC) and 3 Independent First Nations

First Nations Territories